

11. The method of claim 9, further comprising, prior to performing the standardization with respect to the image data, employing a smoothing process for smoothing the image data of the respective pixels disposed within the numerical target zone using an average value of image data of adjacent pixels.

12. The method of claim 11, further comprising replacing the image data of each of the respective pixels with an average value calculated from the image data of each of the respective pixels and that of pixels adjacent to each of the respective pixels.

13. The method of claim 9, wherein the standardization is performed using a following equation:

$$NC_{ij} = \left(\frac{C_{ij} - C_{\min}}{C_{\max} - C_{\min}} \right) \times K$$

wherein, NC_{ij} is a standardized image data value of a pixel disposed at a point (i,j),
 C_{ij} a non-standardized image data value of the pixel disposed at the point (i,j),
 C_{\min} is a minimum value of image data within the numerical target zone,
 C_{\max} is a maximum value of image data within the numerical target zone, and
K is a constant.

14. The method of claim 13, wherein the constant K is the number of total gradation of the monitor.

15. The method of claim 9, wherein the image file includes an image data obtained by scanning a growth state of hemispherical grains (HSGs) grown on a

surface of a capacitor.

16. The method of claim 15, wherein the scanning is performed on a cylinder stack (OCS) – type capacitor.

17. The method of claim 16, wherein the scanning of the numerical target of the growth degree of grains includes scanning sidewalls of the OCS-type capacitor.

18. An apparatus for numerically analyzing a growth degree of grains on a surface of a semiconductor wafer, comprising:

a scanning electron microscopy (SEM) for scanning a specific portion of the surface of the semiconductor wafer to generate an image signal;

an analog-to-digital converter for converting the image signal generated by the scanning electron microscopy (SEM) into digital data;

a computing device capable of (i) storing the digital data as an image file, (ii) opening the stored image file to automatically select a numerical target zone for numerating the growth degree of grains on the specific portion of the surface of the semiconductor device, (iii) performing a standardization with respect to image data of respective pixels disposed within the selected numerical target zone to obtain standardized image data values, (iv) comparing the standardized image data values of the respective pixels with a predetermined threshold value, (v) counting the number of pixels whose standardized image data value is greater than the threshold value, and (vi) numerating the growth degree of grains on the surface of the numerical target zone by calculating a ratio of the number of the counted pixels with respect to a number of total pixels disposed within the numerical target zone; and

a display device for displaying the calculated ratio.

19. The apparatus of claim 18, wherein the computing device further comprises a capability for performing a smoothing process for smoothing the image data of respective pixels disposed within the numerical target zone using an average value of image data of adjacent pixels.

20. The apparatus of claim 18, wherein the standardization is performed by the computing device using a following equation:

$$NC_{ij} = \left(\frac{C_{ij} - C_{\min}}{C_{\max} - C_{\min}} \right) \times K$$

wherein, NC_{ij} is a standardized image data value of a pixel disposed at a point (i,j),

C_{ij} a non-standardized image data value of the pixel disposed at the point (i,j),

C_{\min} is a minimum value of image data within the numerical target zone,

C_{\max} is a maximum value of image data within the numerical target zone, and

K is a constant.

21. The apparatus of claim 20, wherein the constant K is the number of total gradation of the monitor.

22. The apparatus of claim 18, wherein the image file comprises image data obtained by scanning a growth state of hemispherical grains (HSGs) grown on a surface of a capacitor.